I claim:

1. An apparatus for optical communications comprising:

means for receiving an optical beam having a variable angle of incidence;

a diffraction grating having a changeable configuration for deflecting the optical beam to a fixed course relative to the receiving means; and

means for detecting the optical beam after it has been deflected to the fixed course, whereby

the diffraction grating deflects the optical beam onto the fixed course independent of the angle of incidence.

2. The optical communications apparatus as defined in Claim 1 further comprising a demodulator for demodulating the optical beam after it has been detected so that information transmitted therein is extracted.

3. The optical communication apparatus as defined in Claim 1 wherein the diffraction grating deflects the optical beam through a deflection angle proportional to the angle of incidence.

4. The optical communication apparatus as defined in Claim 1 further comprising:

means that use a hologram for measuring the angle of incidence; and

the configuration of the diffraction grating changing responsive to the holographic means.

5. The optical communication apparatus as defined in Claim 4 wherein:

the receiving means includes means for emitting a beacon beam so that the beacon beam intercepts a transmitter; and

the transmitter includes means for forming a conjugate beacon beam from the beacon beam, and means for transmitting the conjugate beacon beam to the receiving means.

6. The optical communication apparatus as defined in Claim 5 wherein:

the receiver also includes a local oscillator for emitting a local oscillator beam;

the local oscillator beam and the conjugate beam intersect at an angle proportional to the angle of incidence; and

the holographic means is for interfering the local oscillator beam with the conjugate beacon beam to form the hologram, so that the hologram has a pattern responsive to the angle of incidence.

7. The optical communication apparatus as defined in Claim 6 wherein the fixed course is parallel to the local oscillator beam.

8. The optical communication apparatus as defined in Claim 7 further comprising an integrating detector array for detecting the hologram.

9. The optical communication apparatus as defined in Claim 8 wherein:

the integrating detector array generates a signal responsive to the pattern of the hologram; and

the configuration of the diffraction grating changes responsive to the signal.

10. The optical communication apparatus as defined in Claim 9 wherein the detecting means includes a spatial filter aligned with the fixed course of the optical beam.

11. The optical communication apparatus as defined in Claim 10 further comprising:

a filtered optical beam being emitted by the spatial filter; and

a high-speed detector for detecting the filtered optical beam.

12. The optical communication apparatus as defined in Claim 10 further comprising:

a filtered optical beam being emitted by the spatial filter; and

a single-photon detector for detecting the filtered optical beam.

13. The optical communication apparatus as defined in Claim 12 further comprising:

a signal generated by the single-photon detector, responsive to the filtered optical beam;

a demodulator for demodulating the signal; and

the demodulator including means for quantum key distribution.

14. The optical communication apparatus as defined in Claim 8 wherein the detecting means is comprised of a heterodyne apparatus, including a heterodyne local oscillator for emitting a heterodyne local oscillator beam collinear with the fixed course of the optical beam.

15. The optical communication apparatus as defined in Claim 5 wherein the emitting means is comprised of a spatial light modulator having a quadratic function written thereon so that the beacon beam has a diverging wavefront.

16. The optical communication apparatus as defined in Claim 15 wherein the spatial light modulator also comprises the diffraction grating.

17. The optical communication apparatus as defined in Claim 5 wherein the emitting means is comprised of a spatial light modulator having a spatially random phase pattern written thereon.

18. The optical communication apparatus as defined in Claim 17 wherein the spatial light modulator also comprises the diffraction grating.

19. The optical communication apparatus as defined in Claim 17 wherein:

the spatial light modulator is also for emitting a secondary beacon beam so that the secondary beacon beam intercepts the transmitter;

the forming means is also for forming a secondary conjugate beacon beam from the secondary beacon beam; and

the transmitting means is also for transmitting the secondary conjugate beacon beam to the receiving means.

20. The optical communication apparatus as defined in Claim 19 wherein:

the beacon beam has a first divergence angle;

the secondary beacon beam has a second divergence angle; and

the first divergence angle is greater than the second divergence angle.

21. A method for optical communications comprising:

receiving an optical beam having a varying angle of incidence;

deflecting the optical beam to a fixed course independent of the angle of incidence; and

detecting the deflected optical beam.

22. The communications method defined in Claim 21 further comprising demodulating the detected optical beam to obtain information transmitted therein.

23. The communications method defined in Claim 22 wherein deflecting the optical beam is comprised of applying the optical beam to a spatial light modulator having a changeable configuration responsive to the angle of incidence.

24. The communications method defined in Claim 23 further comprising:

interfering the optical beam with a local oscillator beam to form a hologram; and

changing the configuration of the spatial light modulator responsive to the hologram.

25. The communications method defined in Claim 24 further comprising spatially filtering the deflected optical beam by directing the optical beam through an optical aperture.

26. A method of communicating that uses a laser beam comprising:

generating a conjugate beacon beam incident to a local oscillator beam at an angle of incidence relative thereto;

forming a hologram responsive to the angle of incidence;

deflecting the laser beam through a deflection angle responsive to the hologram, to a fixed course relative to the local oscillator beam; and

detecting the deflected laser beam.

27. The communications method recited in Claim 26 wherein the hologram forming step includes interfering a local oscillator beam with the conjugate beacon beam.

28. The communications method defined in Claim 26 wherein the step of deflecting the laser beam includes:

writing a diffraction grating pattern responsive to the hologram on a spatial light modulator; and

applying the laser beam to the spatial light modulator

29. The communications method defined in Claim 28 wherein the detecting step includes aligning a spatial filter with the fixed course of the deflected laser beam.

30. The communications method defined in Claim 29 further comprising the step of demodulating the detected laser beam to extract information transmitted therein.

31. The communications method defined in Claim 28 further comprising:

emitting a beacon beam having a phase profile;

intercepting a transmitting means with the beacon beam; and

generating the conjugate beacon beam with a conjugate phase profile derived from the phase profile of the beacon beam when the beacon beam intercepts the transmitting means.

32. The communications method defined in Claim 31 wherein the phase profile is a quadratic phase profile, so that the beacon beam has a spherical diverging wavefront.

33. The communications method defined in Claim 31 wherein the phase profile is a spatially random phase pattern.

34. The communications method defined in Claim 26 wherein the fixed course is parallel to the local oscillator beam.

35. The communications method defined in Claim 26 wherein the deflection angle is proportional to the angle of incidence.

36. A method of communication that uses a laser beam comprising:

intercepting a receiving means with a conjugate beacon beam;

forming a first hologram by interfering the conjugate beacon beam with a local oscillator beam;

generating a secondary beacon beam responsive to the first hologram so that it intercepts a transmitting means;

forming a secondary conjugate beacon beam responsive to the secondary beacon beam;

intercepting the receiving means with the secondary conjugate beacon beam at an angle of incidence;

forming a second hologram responsive to the angle of incidence;

deflecting the laser beam through a deflection angle responsive to the second hologram, to a fixed course relative to the local oscillator beam; and

detecting the deflected laser beam.

37. The communicating method as recited in Claim 36 wherein the step of forming the second hologram includes interfering the secondary conjugate beacon beam with the local oscillator beam.

38. The method of communication as recited in Claim 37 wherein the step of deflecting the laser beam includes:

writing a diffraction grating pattern responsive to the second hologram on a spatial light modulator; and

applying the laser beam to the spatial light modulator.

39. The method of communication as recited in Claim 38 further comprising;

generating a beacon beam by writing a spatially random phase profile on the spatial light modulator; and

deriving the conjugate beacon beam from the beacon beam.

40. The method of communication as recited in Claim 36 wherein the deflection angle is proportional to the angle of incidence.

41. The method of communication as recited in Claim 36 wherein the fixed course of the laser beam is parallel to the local oscillator beam.

42. An apparatus for communicating through free-space, comprising:

a receiver including a spatial light modulator for emitting a beacon beam;

a transmitter for forming a conjugate beacon beam responsive to the beacon beam, and also for transmitting the conjugate beacon beam and a communications beam carrying information across free-space;

the spatial light modulator also being for deflecting the communications beam to a predeterminable course; and

means for detecting the communications beam aligned with the predeterminable course.

43. The communications apparatus defined in Claim 42 wherein:

the receiver includes a local oscillator for emitting a local oscillator beam;

a hologram is created by interfering the local oscillator beam and the conjugate beacon beam; and

the spatial light modulator forms a diffraction grating responsive to the hologram, whereby

the communications beam is deflected by the diffraction grating to the predeterminable course.

44. The communications apparatus defined in Claim 43 wherein:

the detecting means comprises a spatial filter; and

the spatial filter is aligned with the predeterminable course.

45. The communications apparatus defined in Claim 44 further comprising:

a filtered communications beam being obtained by passing the communications beam through the spatial filter;

the detector means including a detector for detecting the filtered communications beam and for emitting a responsive signal; and

a demodulator for demodulating the signal, whereby

the information carried by the communications beam is extracted.

46. The communications apparatus defined in Claim 45 wherein the detector is a high-speed detector for direct detection.

47. The communications apparatus defined in Claim 45 wherein the detector is a single-photon detector.

48. The communications apparatus defined in Claim 42 wherein the detecting means is a heterodyne apparatus including a heterodyne local oscillator for emitting a heterodyne local oscillator beam collinear with the predeterminable course of the communications beam.

49. The communications apparatus defined in Claim 42 wherein the spatial light modulator is written with a quadratic phase profile for emitting the beacon beam.

50. The communications apparatus defined in Claim 42 wherein the spatial light modulator is written with a spatially random pattern of 0 and π phase values, for emitting the beacon beam.

51. The communications apparatus defined in Claim 43 wherein:

the conjugate beacon beam has a first angle of incidence with respect to the receiver;

the receiver includes an integrating detector array upon which the hologram is formed; and

the conjugate beacon beam impinges the integrating detector array at a second angle of incidence that is proportional to the first angle of incidence.

52. The communications apparatus defined in Claim 51 further comprising a telescope for transforming the first angle of incidence into the second angle of incidence.